I hereby declare that the work in this thesis is my own except for quotations and summaries hich have been duly acknowledged

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In the name of Allah, the most gracious and the most merciful

I dedicate this thesis to my beloved family who has been a source of constant support, advice, encouragement, motivation, and love through all this journey.

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I hope you will enjoy reading my PhD thesis about construction leadership. If you have any questions, please feel free to contact me.

ABSTRACT

Failure of construction projects could be attributed from several challenges that emerged along the construction processes. These challenges are categorised as resources allocation, time, cost, quality, safety, project complexity, changes, uncertainties, and communication. It requires several approaches to handle these challenges and one of it is to have good quality of leadership that not rely on their authority. A study has shown that poor leadership contributed 67% to the project's failure. Hence, this study was intended to develop relationship between leadership characteristics with construction challenges in avoiding project failure. This study was carried out based on quantitative approach that involved questionnaire survey using face-to-face technique with selected respondents at managerial level of G7 Contractor Company. The survey has resulted with 117 valid responses. Results from the survey analysis were applied to develop PLS-SEM relationship model which consisted of 43 leadership characteristics which are categorised into 4 groups and 9 construction challenges which is categorised into single group. The model was statistically validated with Goodness-of-Fit (GoF) value of 0.349 which is categorised as medium validating power. Based on the developed model, the most influential leadership characteristic group in handling the construction challenges is smart decision. While the most challenging construction challenges is safety management. To ensure that the model is applicable to the Malaysia construction industry, expert verification by selected construction experts was conducted and found that majority of the experts agreed on the model outcomes thus indicate that the model is suitable to the industry. Hence, it can be concluded that the study has uncovered the importance of leadership characteristics and its relationship with the construction challenges which fills the gap of study on Malaysia construction industry.

ABSTRAK

Cabaran yang timbul dalam proses kerja pembinaan boleh dikaitkan dengan kegagalan sesuatu projek. Antara kategori cabaran ini ialah peruntukan sumber, masa, kos, kualiti, keselamatan, kerumitan projek, perubahan, ketidakpastian, dan komunikasi. Ia memerlukan beberapa pendekatan untuk menangani cabaran- cabaran tersebut dan salah satu daripada pendekatan itu adalah dengan mempunyai kepimpinan berkualiti tanpa bergantung kepada kuasa yang dimiliki. Kajian lepas telah menunjukkan kepimpinan yg lemah menyumbang 67% kepada kegagalan projek. Oleh itu, kajian ini bertujuan untuk membangunkan hubungan antara ciri kepimpinan dengan cabaran pembinaan untuk mengelakkan kegagalan projek. Kajian ini dijalankan dengan pendekatan kuantitatif yang melibatkan soal selidik menggunakan teknik bersemuka dengan responden terpilih di peringkat pengurusan syarikat Kontraktor G7. Kaji selidik ini menerima 117 maklum balas. Keputusan analisis kaji selidik digunakan untuk membangunkan *PLS-SEM* model hubungan yang terdiri daripada 43 ciri kepimpinan yang dikategorikan kepada 4 kumpulan dan 9 cabaran pembinaan yang dikategorikan kepada kumpulan tunggal. Model itu disahkan secara statistik dengan nilai *Goodness-of-Fit (GoF)* 0.349 yang dikategorikan sebagai kuasa pengesahan sederhana. Berdasarkan model yang dibangunkan, kumpulan ciri kepimpinan yang paling berpengaruh dalam menangani cabaran pembinaan adalah keputusan bijak. Manakala cabaran pembinaan yang paling mencabar adalah pengurusan keselamatan. Bagi memastikan model yang dibangunkan boleh digunapakai dalam industri pembinaan Malaysia, pengesahan pakar telah dijalankan dengan pakar pembinaan yang terpilih. Keputusan mendapati bahawa majoriti pakar bersetuju dengan hasil yang diperoleh daripada model tersebut sekaligus menunjukkan kesesuaian model kajian dengan industri. Oleh itu, dapat disimpulkan bahawa kajian ini telah mendedahkan kepentingan ciri kepemimpinan dan hubungannya dengan cabaran pembinaan yang memenuhi jurang kajian dalam industri pembinaan Malaysia.

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LIST OF SYMBOLS ANDABBREVIATIONS

SS	-	Sample size
Z	-	Z value (1.96 for 95% confidence level)
P	-	Percentage picking a choice, expressed as a decimal (0.5 used for sample size needed)
C	-	Margin of error (9 %)
M	-	Mean
X	-	Individual data points
N	-	Sample size (number of data points)
S^2	-	Standard deviation
X	-	Individual score
M	-	Mean of all scores
N	-	Sample size (number of scores)
f^2	-	Effect size
$R^2_{included}$	-	Coefficient of determination (R^2) value of the endogenous latent variable when a selected exogenous latent variable is included in from the model
$R^2_{excluded}$	-	Coefficient of determination (R^2) value of the endogenous latent variable when a selected exogenous latent variable is excluded from the model
q^2	-	Predictive relevance
$Q^2_{included}$	-	Value of the endogenous latent variable where all the exogenous latent variables are included in the model
$Q^2_{excluded}$	-	Selected exogenous latent variable is excluded from the model
GoF	-	Goodness-of-fit
AVE	-	Average communality
R^2	-	Coefficient of determination

CIDB	-	Construction Industry Development Board
GDP	-	Gross Domestic Product
CITP	-	Construction Industry Transformation Programme
PMO	-	Programme Management Office
MYR	-	Malaysian Ringgit
CPS	-	Construction project success
SEM	-	Structural equation modeling
PLS-SEM	-	Partial Least Squares Structural Equation Modeling
CB-SEM	-	Covariance-Based Structural Equation Modeling
EFA	-	Exploratory factor analysis
SPSS	-	Statistical Package for Social Sciences
CSV	-	Comma delimited
AVE	-	Average variance extracted

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CHAPTER 1

INTRODUCTION

1.1 Background of study

Construction industry is dynamic in nature because of the uncertainty in technology, budgets, and development processes (Jain & Pathak, 2014). This industry involves activities such as planning, designing, and construction of buildings from start to completion to adhere contract time, scope, cost and quality (McKeon, 2011). According to Udhayakumar & Karthikeyan (2014), construction industry is considered one of the largest industries in the world that holding 18% of gross domestic product (GDP). The operations of construction industry need intensive labour, skills and commitment, and effective organisation of the manpower (Morton & Ross, 2008).

Traditionally, construction project performance is measured in terms of cost, time, and quality criteria (Chan *et al.*, 2001; Bowen *et al.*, 2002; Ali & Rahmat, 2010; Singh *et al.*, 2014). Other studies stated the performance also includes safety as additional criteria (Enshassi, 2003; John & Ganah, 2011; Wanberg *et al.*, 2013). Once the project size becomes larger, it's becoming more challenging especially during the implementation stage and thus likely will disrupt the targeted performance (Ali & Kamaruzzaman, 2010). Hence to deal with this challenge, specific skill, expertise, experience and knowledge of the construction team need to be applied appropriately with a good guidance of quality leadership in avoiding any potential project overruns (Muda *et al.*, 2016).

Achieving successful construction project completion requires supporting of many parties in managerial position of leaderships. Principally, leadership is developed within a group of organization where leader organize, motivate and assign tasks to achieve its ultimate goals (Opoku *et al.*, 2015). Features of the construction project such as large number of tasks, expensive and difficult make leadership factor is crucial (Ofori & Toor, 2012) particularly as value added in successful of construction project delivery (Amade *et al.*, 2015). Like the other effort, the importance of leadership quality in construction are to ensure the smooth running of projects (Senam *et al.*, 2014), to satisfy conflicting requirements in support of organizational success (Udhayakumar & Karthikeyan, 2014), to increase the company's profitability, to create new opportunities for companies to apply its skills (Russell & Dunn, 2004), and to develop leader to professional ladders (Udhayakumar & Karthikeyan, 2014).

Leaders should have knowledge and skills on the subject they are led. Concurrently, to be successful construction leaders they should have extensive knowledge and experienced in construction to set a good example to their subordinates. Besides, construction leaders have to build active collaboration with all building practitioners during the construction process to speed construction progress and driven to project success orientation. In that case, leaders must be available to handle mistakes, delays, or emergencies at the job site (Watson, 2007). Furthermore, good construction leaders need to be effective and successful strategist (Jankovic, 2012) for overall success of providing the owner's actual development (Hills *et al.*, 2008). An effective leader is built from inference, experience and instinct (Gharehbaghi & McManus, 2003). Conversely, strategic leaders generate a viable organization that will be capable of working in all circumstances (Martin, 2011).

1.2 Problem statement

Failure of construction projects could be attributed from inability to handle challenges that emerged along the construction processes. Muir (2005) classified the challenges into two categories namely construction activities and peripheral pressures. Later Okoye *et al.* (2015) classified the challenges into nine categories

which are resource allocation, time management, cost management, quality management, safety management, complex organizational management, change management, uncertainties management, and communication. There are many approaches in handling these challenges and one of it is by having good quality of construction leaders. Weak leaders will not able to cope with challenges in the construction industry (Isa *et al.*, 2013). According to Nauman & Khan, (2008), poor leadership contributed 67% to the failure of projects while positive leadership practice contributed almost 76% to the success of project.

There are many studies on the leadership issues in construction industry and majority of these studies focussed on leadership style only. For instance, Rowlinson *et al.* (1993), Chiang (2002), Panthi *et al.* (2008), Jung & Mills (2012), Liphadzi *et al.* (2015) and Zhao *et al.* (2016) studied construction managerial leadership styles. However there are also studies that relate leadership style with project's performance. Hammuda & Dulaimi (1997) studied the effects of the situational variables to leadership styles in construction projects. In 2004, Andi studied the effectiveness of project managers' leadership styles toward construction implementation. Chan & Chan (2005) studied transformational and transactional leadership styles which relate to construction performance. Larsson *et al.* (2015) studied the effects of project managers' leadership styles on project performance. Furthermore, there are also studies which relate between leadership traits/ skill/ qualities of construction project managers' and project's performances such as by Bhangale & Devalkar (2013) who studied leadership skill required for successful completion of construction projects. Then in 2014, Ekung & Ujene studied the leadership traits of construction project managers and its impact on project delivery. Followed by Udhayakumar & Karthikeyan (2014) that studied leadership qualities required for a project leader to lead the team successfully. However for studies on leadership that relate to the challenges, Toor & Ofori (2006) had presented a study on the need of leadership qualities in handling industry-specific and environment challenges. This followed by Anderson & Polkinghorn (2008) which studied leadership challenges in facing conflict resolution. Mouchi *et al.* (2011) and Zavadskas *et al.* (2015) studied leadership for managing complex construction projects. Recently Maaroufi & Asad (2017) had studied leadership style for handling challenges in multicultural construction teams.

However, in Malaysia context, limited studies on construction leadership were conducted. Literature found that Zakaria *et al.*, (2015) studied the required project manager's leadership skill for successful construction project. Then by Tabassi *et al.* (2016) studied leadership competences and transformational leadership qualities for construction project managers. Muda *et al,* (2017) studied leadership capability of team leaders in the construction industry. All of these studies were still at a preliminary stage by identifying the leadership characteristics. Hence, there are opportunities to explore and expand further research on leadership in Malaysia construction industry as such the relationships between leadership with construction project performances. However, for this study, it was intended to relate leadership characteristics with the challenges during project implementation in Malaysia construction industry. This study will provide a key component of any construction organization to move towards achieving the best practice amongst construction project leader in minimising the risk of project failure.

1.3 Study aim and objectives

Aim of this study is to establish relationship between leadership characteristics and challenges in handling construction project. Achieving this aim, the following objectives are to be carried out to:

i. Determine the risk of construction challenges affecting the project performance
ii. Classify degree of significance of each leadership characteristics in handling construction challenges
iii. Develop a relationship model of leadership characteristics with the construction challenges

1.4 Scope of the study

This study focuses on relationship between significant leadership characteristics with dominant challenges in construction projects. As such the scope of this research is defined as follows:

i. This study is conducted in quantitative approach through questionnaire survey
ii. This study involved from grade G7 construction organization registered with Construction Industry Development Board (CIDB).
iii. The targeted groups of respondents are managerial level who have been well experienced, competitive, and have successfully handled large construction projects.
iv. The locality of respondent is throughout peninsular Malaysia.
v. The tool that is to be applied in developing structural equation model is Smart PLS-SEM software.

1.5 Significance of the study

This study has explicitly uncovered the relationship of leadership characteristics for construction leaders in addressing construction project challenges. The significance of this study was as follows:

i. Academician

   The finding from the research will contribute to body of knowledge to the study of leadership in the construction project management. They can adapt and use any important point or facts for further investigation in related research areas.

ii. Practitioner

   The developed model will provide information to the construction leaders regarding the relationship between significant leadership characteristics with challenges in construction projects. Construction leaders will know when to practiced and apply the appropriate leadership's characteristics in addressing

challenges faced by leaders in various stage of the construction project. The use of these characteristics able to develop strong quality of construction leader that will contribute to productivity enhancement directly, indirectly or both and finally geared construction companies to stay competitive and successful in the construction industry.

1.6 Organization of the thesis

The thesis for this study was organized into 7 chapters as follows:

Chapter One: The chapter discusses about the need of study which cover pertinent elements such as problem statement, study aims & objectives, and scope.
Chapter Two: The chapter contains the review of background of construction industry in general, the identification of challenges in construction projects, and leadership quality.
Chapter Three: The chapter describes the study methodology applied in the research.
Chapter Four: The chapter highlights and explains the research finding of construction challenges risk and significant leadership characteristics.
Chapter Five: The chapter discusses the development PLS-SEM model on relationship between leadership characteristics and construction challenges. It also describes the statistical evaluation of the model.
Chapter Six: The chapter discusses experts' verification on the PLS-SEM model to ensure that the model is relevant to the actual construction scenario.
Chapter Seven: The final chapter discusses about conclusion and recommendation.

1.7 Summary

The introduction chapter of this study has provided background of the study in terms of the construction project leadership and further describes the problem statement. This is followed by the research aim and objectives, scope and significance of the study. The chapter concludes with the organization of the thesis.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The scientific sources were referred including a large number of supported materials in order to build a good understanding in the area of the study. Based on these materials, the literature review has been split into five main sections as follow:

i. Leadership quality
ii. Construction industry
iii. Related previous studies
iv. Risk assessment
v. Theory of SEM

2.2 Leadership quality

Leadership has been practiced amongst construction leader directly and indirectly since last century. Leaders who seek progress should be available to lead his/ her subordinates at the right time naturally. Consequently, leaders must always updating and renew his leadership skill for high progressive impact on performance. From literature review, there are numbers of definitions of leadership. For instance, Gharehbaghi & McManus (2003) define leadership as a person influences to complete a mission, job, or objectives and to give directions for more well-organized

& practical organization. To Chan & Chan (2005), leadership is the social exchange process between leader and follower relation.

Besides that, Hirtz *et al.* (2007) states that leadership is the process to influence subordinates to works in achieving organizational goals. PMBOK (2008) concludes that leadership is the ability to guide project team in the meantime achieving project objectives and balancing project constraints. Yukl (2010) defined leadership as the process of influencing others to understand and agree in conducting the work, and facilitating individual and collective efforts to accomplish shared objectives. Other than that, Yakhcali & Farsani (2013) define leadership as the ability to influence others to improve results. From here, it can be stated that leadership can be labelled as many different definitions. However, for this study leadership mean the handling's actions from members of construction project management in achieving project objectives.

2.2.1 Theories of leadership

Over the last eighty years, numbers of theories of leadership have been proposed. These theories are separated into four major categories including trait, behavioural, contingency, and integrative (Lussier & Achua, 2013).

i. The trait theory (1930's to 1940's)

The idea behind trait theory is effective leader's shared common traits (Turner & Muller, 2005). It is the earliest leadership theory proposed by Ralph M. Stogdill (Northouse, 2009). Trait theory is based on the assumption that leaders are born rather than made (Hammuda & Dulaimi, 1997). Trait theory is related to 'Big Five' personality dimensions consists of five basic dimensions such as extraversion, emotional stability, agreeableness, conscientiousness, and openness to experience (Barrick & Mount, 1991).

ii. The behavioural leadership theory (1940's to 1960's)

The behavioural theory is based on the assumption that leaders are made rather than born (Turner & Muller, 2005; Muller & Turner, 2010). The rationale for this assumption is people can learn to become a good leader by adopting certain behaviours for specific situation (Muller & Turner, 2010). Two important studies

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